The Impact of the Implementation of Business Intelligent to Support Decision-Making in the American Banking Industry: A Literature Review

by Arta Moro Sundjaja

THE IMPACT OF THE IMPLEMENTATION OF BUSINESS INTELLIGENT TO SUPPORT DECISION-MAKING IN THE AMERICAN BANKING INDUSTRY: A LITERATURE REVIEW

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ABSTRACT

In facing globalization era, companies need to have innovation to survive in business competition. A change is needed to make a successful inovation, when a company needs a leader who has a strong managerial ability. The application of technology, in this case is business intelligence (BI), is an innovation that can be carried out by the management leader to survive in the complex world competition by finding appropriate decisions to solve business problems. This article was a literature review that concerned to exploration of the role of leadership and managerial ability in the application of BI on First American Company (FAC). The authors retrieved articles from google scholar with keywords, such as: leadership, managerial ability, and business. The implementation of BI on FAC proves to be a successful innovation formulated by the management who manage to change the company's financial situation that loss into a profit and managed to become the market leaders. In addition, this article also presented some cases of successful BI implementation which helped resolving credit problems and segmentation

Keywords: *business intelligence, first American company, leadership, managerial ability, decision-making, cultural change*

INTRODUCTION

The ability of an organization in utilizing data and information is a part of the development and the use of complex knowledge with the increase in the volume of internal and external information. An organization experienced environmental conditions' changing with the IT investments as an effort to obtain and analyze information and also to create and disseminate knowledge can improve superiority in competition. An important component in this investment is business intelligence system (Dan, 2008; Lin *et al*., 2008; Trkman *et al*., 2010). Business intelligence can be identified as the integration of reporting, data mining, and online analytical processing application (Niu *et al*., 2009).

Business Intelligence (BI) provides access to data that has been integrated and cleaned so that data can be analyzed, manipulated, transformed, and combined to find correlations, trends, and patterns that can offer new insights and support in the decision making process (Watson, 2009). One sign of change in the competition area is the shift of bureaucratic organization into a form of organization that is sensitive to vertical, horizontal and, external challenges and opportunities. Implementation of BI systems requires support from considerable complex resources, the success factors in the implementation of BI systems is the support and funding from the management, orientation to the user, change management, a clear vision and a clear problem, a business-oriented methodology and project management, balanced composition of the project team, flexible technical framework, good data quality and governance framework (Yeoh *et al*, 2008). According to Niu *et al.*

(2009), Business intelligence is a process of extracting, transformation, managing, and analyzing business data for supporting decision making. In this process, it is often involving large data set that is stored in data warehouse. Business intelligence processes have five stages: (1) Data collection, business intelligence systems can extract data from multiple data sources with various business units such as marketing, production, human resources, and finance. Data that has been extracted need to be cleaned, transformed, and integrated to be analyzed. (2) Data analysis, at this stage, the data is converted into information or knowledge through a variety of analytical techniques such as reporting, visualization, and data mining. Results of the analysis process can help the management to understand the situation and take better decisions; (3) Situation Awareness, awareness of the situation can provide a deeper understanding of the state of current decisions based on data analysis; (4) Risk Assessments, various situation awarenesses can help managers to predict the future, identify threats and opportunities, and respond as needed. Today, the business is operating in a complex environment. Business decisions have more risks from external and internal environment. It can be concluded that the risk assessment is an important function in the business intelligence system; (5) Decision Making Support, the main goal of business intelligence is to help managers make wise decisions based on current business data.

According to Inmon (2002), (as cited in Niu *et al.*, 2009), business intelligence system consists of four levels of components and metadata management module. General architecture of a business intelligence system is attached in Figure 1. The components are interacting to facilitate basic functions of business intelligence: extracting data from the company's operating system, storing the data that has been extracted into the data warehouse, and getting the data that has been stored for various business analysis applications. Referring to Figure 1, business Intelligence components consist of: (1) Operational system level, as the data source of business intelligence systems, business operating systems in general use the system online transaction processing (OLTP) to support daily business activities. In general, OLTP system is divided into customer order entry system, financial systems, and human resource systems; (2) Data acquisition level, this level is a pre-process component which consists of three stages: extract, transform, and load (ETL). A company has several OLTP systems that generate a very large amount of data. The data is first extracted from the OLTP system by ETL process and then transformed according to the transformation rules. If the data has been transformed, then the data will be entered into the data warehouse. ETL is a basic component of business intelligence systems due to data quality of the other components depending on the ETL process. In designing and developing ETL, data quality, system flexibility, and speed of the process are the major concerns; (3) Data storage level, the data processed by ETL components is stored in a data warehouse which is usually implemented using relational database management systems (RDMS). RDMS is designed to support the transaction process. This is in contrast to the data warehouse which focuses on the subject, making it stored in an integrated way as the time varies. Star schema and snowflake schema is the most popular data warehouse schema. Whatever scheme is used, the type of the table in a data warehouse is the fact tables and dimension tables; (4) Analytic level, based on the data warehouse, various analytical applications have been developed.

Business intelligence system supports two basic types in analytical functions: reporting and online analytical processing (OLAP). The function of reporting is providing manager with various types of business reports, such as sales reports, product reports, and human resources reports. Reports are generated from running queries into the data warehouse. Data warehouse queries are generally defined by the data warehouse developers. Reports generated by business intelligence systems typically have a static format and contain the type of definitive data. The most promising analytical of business intelligence is OLAP. According to Codd *et al.* (cited by Niu et al., 2009), OLAP enables managers to efficiently explore business data from multiple dimensions of analysis through the operation of slicing, cutting and deepening. A dimensional analysis is the perspective through how the data is presented, as an example: the type of product, sales location, time and customers. Comparing to the function of reporting, OLAP supports data analysis according to the needs. OLAP is a multidimensional data model known as snowflake schema and star schema. In addition to the reports

and OLAP, there are many other types of analytical systems that can be made based on the data warehouse such as data mining, executive dashboards, customer relationship management, and business performance management.; (5) Management of metadata, metadata is a special data regarding to other data such as data sources, data storage warehouse, business rules, access authorization, and how the data is extracted and transformed. Metadata is an important part for producing information that is accurate, consistent, and can maintain the system. Metadata management affects all the processes of designing, developing, testing, deploying, and using business intelligence systems.

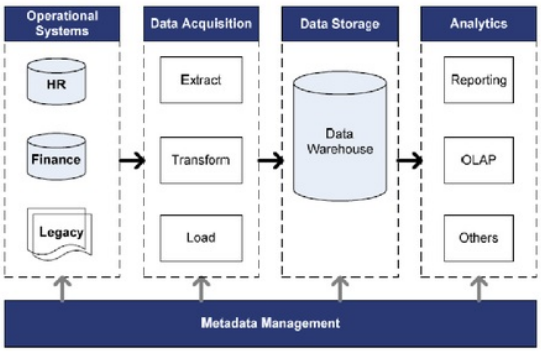

Figure 1 Architecture of Business Intelligence System in General
(Source: Niu *et al.*, 2009)

METHODS

To explore the role of leadership and managerial ability in the application of business intelligence on the banking industry, the authors searched all published article about leadership, managerial ability, and business intelligence in google scholar. The authors used literature review study to explain and build the conceptual model of the role of leadership and managerial ability in the application of business intelligence on the banking industry. This is to improve the quality of decisions taken by the management company in solving business problems and cultural changes as a result of the application of these technologies. Exposure implementation of business intelligence at this writing begins with the role of business intelligence in the banking industry, continuing to illustrate the application of business intelligence on some business cases and concluded with the business implications of the implementation of business intelligence.

RESULTS AND DISCUSSIONS

Leadership is the use of power by one of the organization members to the other members to help the group or organization achieves its objectives (George & Jones, 2012). In order to achieve the objectives of the company, a leader needs to motivate their subordinates. Path-Goal Theory developed by Robert House stated that leaders need to determine the achievement result, remuneration to subordinates who can perform his duties with utmost to achieve its intended purpose, and ensure subordinates to have a belief that they can achieve their work goals with good quality (Robbins, 1996). Factors that influence effective leadership are intelligence, job knowledge, dominance, confidence, physical, tolerance of stress levels, integrity and honesty, and emotional maturity (George & Jones,

2012). The purpose of learning the behavior of organizations is to provide a tool for managers, so they can use the tool to improve their ability in the function and role of the organization. The ability in this context is an ability of individual to be able to work well in accordance with its role within the organization. A manager needs three skills to give their contribution to the functions and roles within the organization, namely: conceptual ability, managing people ability, and technical ability that are in line with business functions (George & Jones, 2012). Organization is composed of managers who are embedded their daily decision-making, sometimes there are some decisions that are taken by some managers because of the characteristics of the problems faced. The decision making process in organizations is influenced by several factors such as organizational structure and degree of environmental stability and internal or external. There are four types of decision-making process: the management science approach, the Carnegie models, the incremental decision models, and the garbage can models (Daft, 2008).

The management science is a good tool in the decision-making process which can be analyzed, problems can be identified and variables measured. Mathematical models can contain thousands of variables where one of them is relevant to the desired output (Turban *et al*., 2010). The Carnegie model is an approach in which the development of the coalition is used in the event of a conflict within the organization's goals and priorities of the problem so that managers need to discuss and seek understanding of the priority issues. The incremental decision models is used by managers at the time the problem can be identified but there is no certain solution so managers need to take risks and try the solution slowly to study the success of such solutions. The garbage can model is used with a high uncertainty on the problem and solution so that managers need to take a decision to take a step forward by proposing a new idea, spending some time in certain areas and surviving with potential solutions. According to Balta *et al.* (2010), demographic characteristics of a leader such as education level and functional backgrounds influence the decision-making process. Education level is an indicator of knowledge and ability as a leader in processing information, identifying, and analyzing various alternative solutions. Leaders who have higher education are more focused on analytical techniques in strategic level of decision-making process than leaders who just learned from experiences. Functional background of leaders can be divided into two general categories, output and throughput. Output function includes the functional areas related to sales, marketing, RnD, among others. Whereas the throughput function includes area of production, engineering, finance, and accounting. This classification connects functional background with decision-making, organizations with technology-oriented tend to appoint a leader who has the functional expertize that can drive the success of an organization.

Culture is a set of values, norms, beliefs, and understanding on what is widely understood by all members of an organization and teaches new members how to think, feel, and behave correctly (Daft, 2008). The ability of the corporate culture in motivating its staff depends on how members learn values and norms owned by the company. In general, companies use socialization, stories, ceremonies, and language (George & Jones, 2012). Culture can play an important role in creating organizational changes that cause learning and innovative responses to the challenges, the threat of competition, or the new opportunities. A strong culture can encourage adaptation and changes to the company's performance by providing additional energy and motivating its members, uniting all members with the mission and goals of the corporate itself, shaping and directing the behavior of the member to fit the company's strategy (Daft, 2008). Application of information technology in this data warehouse can push organizational changes where the application of data warehouse has changed the mindset of every employee by creating a profit that can be measured at the level of application and organization (Cooper *et al.,* 2000). Prior to the implementation of the data warehouse, business unit uses a passive approach in business innovation and tend to use trial and error approach in solving a problem.

In the era of big data, the company is managing transaction data in very large number and humans have a limited ability to analyze data in a very large number to produce useful information that will help in the decision-making process (Trkman *et al*., 2010). According to research from

Cooper *et al.* (2000), in 1990 First American Corporation (FAC) lost $60 million and operated in agreement with the regulators. Currently, FAC is already in favorable/good conditions and become leader in terms of innovation in the financial services industry. This change is caused by a fairly ambitious vision strategy and big investment of data warehouse. The role of leadership and change management play a huge role in changing the old culture. FAC vision strategy is Tailored Client Solutions (TCS), it is a strategy oriented in customer relationships where the customer as the center of all aspects of company operations. This strategy was developed by the marketing department, senior management, and important staff in the finance department. This strategy has four components which are comprehensive customer information, flexible product line, consistent service, and distribution management suit with the customers' wishes. FAC redesigns all aspects of business operations and changes mindset and work pattern of all their employees, from top management until the operational level, to support this strategy. There is a shift from "the banking by intuition" to "banking by information and analysis". The role of finance department has changed from just as transaction registrar to be more aggressive in seeking the best ways to generate revenue. In defining a good customer, the marketing department decided to base it on the profit rate. This change is not easy or comfortable, so all employees who can adapt and take the initiative to improve their performance will be more prosperous.

In the decision-making process, the stages of identification and diagnosis of the problem are the most important things in formulating appropriate solutions. Data mining can provide contribution in solving the business issues in the industry by identifying the patterns and the trends, how the function of funds stages to the economic conditions, political conditions, and social condition. Correlations between different variables in business data cannot be directly seen by the manager because the data volume is too large and the analysts have a limitation in processing the data. Manager needs a few steps before concluding the behavior patterns of the customer to understand, separate, retain, and maintain profitable customers. Business intelligence and data mining helps managers and product managers in identifying various classes of customers and products or services that fit the needs of customers and/or determining pricing strategies to generate better income management (Ubiparipović & Đurković, 2011). TCS is the first component of comprehensive customer information and with the implementation of business intelligence in the FAC, the segment managers, financial analysts, and marketing analysts can provide the right products and services to its customers. So that the customers will become loyal and the profits can be increased up to 15%. Moreover, the representative of the customer services can analyze customer complaints which resulting in an increasing fee of income more than $ 1.3 million in 1997 and 1998. In terms of remuneration by the marketing manager and segments manager toward the customer, there are 43,000 selected customers in this program which have an impact to the addition of loan funds, deposits, and investments up to $ 1.4 billion (Cooper *et al.*, 2000). It can be concluded that with the implementation of business intelligence, FAC managed to become a very profitable financial company and become a leader in the financial services industry.

The role of business intelligence in solving business problems and decision-making at the other areas is the result of the implementation of customer credit scoring model (Ince & Aktan, 2009). Credit score of customers is the most important activity to evaluate loan applications submitted by the customer. Credit score system is used to model the potential risk of loan applications, where the system has the advantage of being able to handle large amounts of loan applications quickly without requiring a lot of resources. So, it can reduce the operating costs and effective to reduce reasoning in the decision. The competition and growth in the credit market's consumer makes the banking industry compete to develop better strategies with the help of credit scoring models' application. The purpose of credit scoring is to give the ability for credit analysis division to determine client's loan application that was received from the bank marketing, including "good credit" and "bad credit". The customers included in "good credit" category have a significant possibility to pay their financial obligations to the banks. Meanwhile, the customer included is "bad credit" category have an insignificant possibility to fulfill their financial obligations.

Based on the results of studies conducted by Ince and Aktan in 2009, the researchers were comparing the performance of credit scoring model with the one using the traditional approach and the other one is using artificial intelligence (discriminant analysis, logistic regression, neural networks, classification, and regression tree). Research trial with the real data has demonstrated that classification, regression tree, and neural networks are better than/outperforms traditional credit scoring models in terms of prediction accuracy and type II errors. An analysis of customer data is a main key for the bank management to generate the maximum profit. By using the Pareto concept, designing products and services to 20% of customers can give results equal to 80% of the profits. The management believes that by analyzing 20% of the customers is an effective step for increasing profits and lowering operational costs. In addition to above cases, the bank management can analyze card marketing, the calculation of selling price and profit for card owner, detection of potential fraud, and prediction of customer life cycle management. Customer segmentation is one of the effective marketing strategies because by understanding the characteristics and needs of each customer segment, the management can design how to market, to set price, to give policy for each product and service so as to provide maximum benefit (Mawoli & Abdulsalam, 2012).

With the implementation of business intelligence, the customer segmentation process becomes easier because the management can easily identify the demographics and geography of the customer but the management must take the time and spend effort if they want to know the psychographic and behavior of customers. Moreover, the management needs to identify the necessary attributes such as age, employment, income, and gender with ease and in general can be measured with recency, frequency, and the value of their transaction behaviors (RFV) (Lin *et al.*, 2008; Sun, 2009).

In Figure 2, the authors tried to create conceptual model to explain the implementation model in the banking industry. The antecedents of perceived of usefulness are leadership, organizational culture, organizational decision making, change and managerial skill. Those antecedents will affect the perceived usefulness on implementation of business intelligence in banking industry.

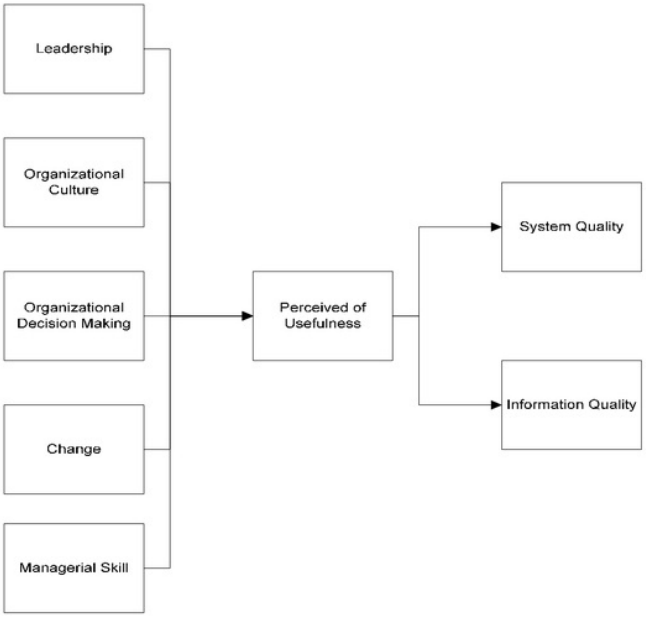

Figure 2 Conceptual Framework in the Implementation of Business Intelligence System in the Banking Industry

CONCLUSIONS

The role of information technology helps companies to store data of daily transactions in very large quantities. So in the era of big data, the managers have limited ability to analyze the data. The business intelligence can help managers identify problems based on data analysis to improve the quality of decision-making. From the case of the application of business intelligence in FAC, it can be concluded that the role of leadership and managerial ability can help changing the corporate culture in terms of decision-making. The application of BI in an area grants credit limits and customer segmentation is currently considerated to use data mining techniques to analyze problems and to find alternative solutions to solve business problems.

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